Weekly Report: 4/10/14

Rebecca Nowak Team 8

"Composite Hydrogel-Nanostructured Structures for Uniform 3D Cell Growth"

I. What I did

Last Friday, I was able to test our serpentine patterned two piece ejector with the hydrogel. As I said last week, we had previously tested the same design in one piece instead of two and the mixing went very well. When we tested the two piece ejector, without any sealant, the liquid squirted out of the sides. I applied a coat of sealant last Friday and we tested it again. When we tested it, the hydrogel material was adequately mixed, and none of the material leaked or came out of the sides. One thing that we still have to clear up with Dr. Nair is what type of hydrogel we will be using. The batch of chitosan that was given to us two weeks ago didn't seem to gel at all. I would really like to see what would happen if we used a quick gelling hydrogel that gels in a matter of a few seconds because this was our original plan. It would be nice to see if the quick gelling hydrogel ejects into an even 1 cm wide strip that keeps its form, because as of now it's hard to tell since our material is still in liquid form when it comes out of the ejector.

Last Friday we also demonstrated the mixing of our two piece serpentine pattern hydrogel ejector and showed images of the pore stamp success. We determined that there are still a few things that we need to do before we are completely finished. We plan to give Dr. Nair the design, along with an older design and have her test it out on her own to see which one she likes best.

II. Future Work

In addition to giving Dr. Nair two ejector designs to test out, we would like to see if she would let us experiment with one of the faster gelling hydrogels. This way we can ensure that the material will eject into a well-formed 1 cm wide strip, as was originally planned, without clogging. We would also like to test out the hydrogel with the fluorescent beads so that we can further prove the effectiveness of the mixing design.

Once we have completed testing with the beads, we would like to spin a new sheet of PCL and use the pore stamp to create an array of pores. We need to look at this under a microscope and try to estimate the average pore size, and also determine the porosity level. We can do this by tearing off a small piece of the stamped PCL and counting the number of pores, taking into account their size and then dividing this by the area of the PCL piece. After this is finished, we would like to put the entire design together using the ejector design to place a thin film of hydrogel on the PCL, and roll them together. We should get a video of this process for demo day.

Additionally, we need to write our abstract for demo day and begin working on the final report and user's manual. Following that, we need to work on the poster for demo day.